

Waves Continued:

• Equation:  $V = f \lambda$

velocity  $\leftarrow$  (m/s)  $\rightarrow$  "lambda" wavelength (m)  
 $\rightarrow$  frequency (Hertz = Hz =  $\frac{1}{s}$ )

- Wavelength  $\rightarrow$  length one full cycle of the wave

- frequency  $\rightarrow$  number of cycles per second

Units: Hertz (Hz) =  $\frac{1}{\text{Seconds}}$

- Velocity  $\rightarrow$  how fast the wave is traveling

• Energy in a wave:

- Waves are just transporting energy

- 2 ways to increase energy:

1. Increase amplitude

2. Increase the frequency

• Doppler Effect:

- Change of frequency due to relative motion between the source and an observer

- As source move closer to observer, frequency increases and wavelength decreases

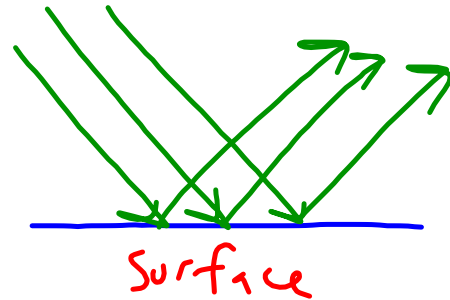
- As source moves away from an observer, the frequency decreases and the wavelength increases

- Wave Interactions:

- Waves can interact with other waves, objects, or a change in medium
- When a wave meets a new surface or boundary, the wave reflects
- When a wave passes the edge of an object or passes through an opening, the wave diffracts.
- When a wave passes from one medium to another, it refracts.

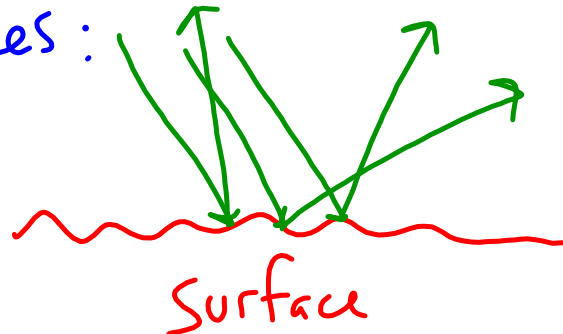
- Reflection:

- Flat surfaces:



- Incoming wave has the same angle as the reflected waves

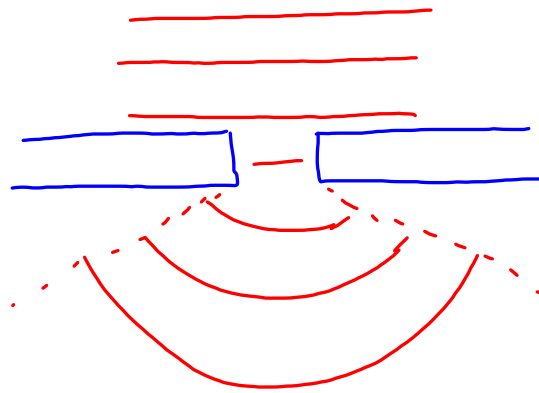
- Rough surfaces:



- Incoming wave and reflected waves have different angles

- Diffraction:

- When waves pass the edge of an object or reach an opening, they will bend or spread.
- For small openings, waves spread out as if they were created there



- Passing an edge, waves will bend around object

